

-20-

CLAIMS

WE CLAIM:

1. A medication dispensing apparatus comprising:
 - a housing;
 - 5 a drive member within said housing and movable in a distal direction;
 - a fluid container defining a medicine-filled reservoir with a movable piston at one end and an outlet at the other end, said piston engageable by said drive member to be advanced toward said outlet when said drive member is moved distally;
 - a plunger movable relative to said housing from a distal position to a proximal
 - 10 position, said plunger manually pushable relative to said housing in the distal direction to be shifted from said proximal position to said distal position;
 - means for interconnecting said drive member and said plunger to convert motion of said plunger from said proximal position to said distal position into a lesser amount of motion of said drive member in said distal direction, said interconnecting means including
 - 15 a gear set including a first pinion in meshed engagement with a rack of said plunger and a second pinion in meshed engagement with a rack of said drive member; and
 - characterized in that at least a portion of said drive member extends through an opening through at least one of said first and second pinions.
- 20 2. The medication dispensing apparatus of claim 1 wherein said first pinion comprises said opening, wherein plunger rack engaging teeth of said first pinion are coplanar with said at least a portion of said drive member extending through said opening, whereby said rack engaging teeth do not extend continuously around said first pinion.
- 25 3. The medication dispensing apparatus of claim 2 wherein an axis of rolling rotation of said first pinion extends through said opening and is oriented generally perpendicular to said at least a portion of said drive member extending through said opening.
- 30 4. The medication dispensing apparatus of claim 1 wherein said plunger rack engaging teeth are arranged with a larger pitch diameter than a pitch diameter of said drive member rack engaging teeth of said first pinion.

-21-

5. The medication dispensing apparatus of claim 2 wherein said drive member includes a first part and a second part, said drive member first part movable in a distal direction, said drive member second part clutchably connected to said first part to be moveable relative thereto in a proximal direction but not the distal direction, said second part comprising said rack in meshed engagement with said second pinion, wherein said first part comprises at least a portion of said drive member extending through said opening.

6. The medication dispensing apparatus of claim 5 wherein distal movement of said drive member first part causes advancement of said piston in the same distance and direction, wherein said drive member first part comprises at least one longitudinally extending row of ratchet teeth and said drive member second part comprises a least one pawl that interfits with said at least one longitudinally extending row of ratchet teeth.

7. The medication dispensing apparatus of claim 6 further comprising at least one anti-back up member operably engaging said drive member first part to prevent movement of said drive member first part in a proximal direction within said housing.

8. The medication dispensing apparatus of claim 1 wherein said plunger comprises a first part, a second part, and a biasing element captured in a preloaded state to bias said first and second plunger parts apart, the preload of said preloaded state selected large enough to allow said plunger to properly operate the apparatus without further compression of said biasing element, and wherein said biasing element is compressible prior to apparatus damaging forces being transferred therethrough during initial shifting of said plunger from said proximal position toward said distal position.

9. The medication dispensing apparatus of claim 8 wherein said plunger first part comprises said rack in meshed engagement with said first pinion, wherein said plunger second part is manually pushable relative to said housing, and wherein said biasing element and said first and second plunger parts are selected and configured to allow said plunger second part to be shifted completely to said distal position from said

-22-

proximal position without distal movement of said plunger first part and with compression of said biasing element.

10. The medication dispensing apparatus of claim 9 wherein said biasing
5 element comprises a coiled spring having a first end that directly engages said plunger first part and a second end that directly engages said plunger second part.

11. The medication dispensing apparatus of claim 1 further comprising means
for preventing an injection until the plunger has been manually shifted to said proximal
10 position that corresponds to a fully cocked position.

12. The medication dispensing apparatus of claim 11 wherein said injection
preventing means comprises a guide and a follower, said guide axially fixed within said
housing and having a proximal end, a distal end, a first travel surface and a second travel
15 surface, said first travel surface interrupted by a plurality of ratchet teeth, said follower
comprising a pawl of said plunger, wherein said pawl slides along said first travel surface
over said plurality of ratchet teeth during movement of said plunger from said distal
position to said fully cocked position, whereby interaction of said ratchet teeth and said
pawl limit distal travel of said plunger, and wherein said follower passes said second
20 travel surface during movement of said plunger from said fully cocked position to said
distal position.

13. The medication dispensing apparatus of claim 12 wherein said guide is
integrally formed with said housing.
25

14. The medication dispensing apparatus of claim 12 wherein said guide
proximal end cams said pawl to shift from said first travel surface to said second travel
surface during movement of said plunger from said fully cocked position toward said
distal position.

15. The medication dispensing apparatus of claim 12 wherein said pawl snaps
against another element to provide an audible indication of the completion of pen cocking
30

-23-

when said pawl passes said guide proximal end during movement of said plunger to said fully cocked position.

16. The medication dispensing apparatus of claim 1 wherein said first pinion
5 and said second pinion are corotatable and coaxially arranged within said housing.

17. The medication dispensing apparatus of claim 1 wherein said second
pinion comprises a pair of mirror image pinions that are coaxial with and flank said first
pinion, and wherein said first and second pinions comprise a one-piece construction.
10